CHAPTER 8

ENERGY AND NATURAL RESOURCES

FINAL ENVIRONMENTAL IMPACT STATEMENT

Brightwater Regional Wastewater Treatment System

VOLUME 2

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Energy and Natural Resources

8.1 Introduction

This chapter addresses the affected environment, impacts to the environment, mitigation measures, and significant unavoidable adverse impacts related to energy and other natural resources for the Brightwater Regional Wastewater Treatment System (Brightwater System). References cited herein can be found at the end of the chapter.

8.1.1 Overview of Chapter

This chapter has been reorganized from the Draft EIS discussion. The new organization is according to treatment and conveyance systems (the Route 9 Systems and the Unocal System) to facilitate comparison among alternatives. The discussion of conveyance features has been developed in greater detail than in the Draft EIS. Impacts within portal siting areas are common to all candidate portal sites; therefore, individual portal sites within the portal siting areas are not discussed.

This chapter has been summarized to focus on relevant findings and conclusions of the energy and natural resources analysis. A discussion of applicable regulations and the methods used for analysis are provided in this chapter to give the reader context for the discussion of impacts. The evaluation of energy consumption is described in Attachment G to Appendix 3-A, Project Description: Treatment Plant, although important conclusions about energy consumption are provided in this chapter.

Comments on the Draft EIS were received from state and local agencies, public interest groups, and individuals. Most of the comments relating to Energy and Natural Resources fell into four main categories.

1. Equipment power requirements
2. How power will be supplied to the plant
3. Types of backup power
4. Using gas from the Cedar Hills Landfill, if it is to offset the Brightwater energy demand

Subsequent to publication of the Draft EIS, a number of the treatment process units have been refined or modified based on evaluations conducted during ongoing predesign activities. These changes have affected the electrical consumption values. The significant changes to the treatment plant systems that have affected the energy and natural resources analysis are as follows:

- Elimination of the gravity-only influent system at Unocal
- Elimination of the effluent pump station at Route 9
- Revisions to the equipment at the plant site, including changing the treatment plant process from a full flow conventional activated sludge (CAS) process to a split flow membrane bioreactor (MBR)/ ballasted sedimentation process
- Two onsite substations (12.5 kilovolt kV or 15 kV and 115 kV) instead of one 115-kV substation
- Elimination of the option to use landfill gas from Cedar Hills Landfill to generate electricity for Brightwater
- Revisions to the substations that feed the candidate portal sites
- Revisions to the backup power system
- Dechlorination moved off the Route 9 treatment plant site to Portal 5 for the Route 9–195th Street Corridor and Portal 26 for the 228th Street Corridor (dechlorination onsite at Unocal)
- Portal 41 Influent Pump Station Option Included

8.2 Affected Environment

This section characterizes the affected environment with respect to energy and natural resources for the Brightwater System, beginning with a summary of the major regulations relating to energy and a review of existing energy resources at the Unocal and Route 9 sites and their respective conveyance routes. The section then describes the affected environment for energy and natural resources specific to the Route 9 and Unocal Systems, including the treatment plants, conveyance facilities, and outfalls.

8.2.1 Affected Environment Common to all Systems

Use of energy and natural resources is directed by a number of regulations, policies, and plans at the local, state, regional, and national levels. These range from prescriptive energy codes to laws and planning policies for energy use in the Pacific Northwest to guidance and initiatives related to sustainable development and green building practices. This section summarizes the regulatory and policy framework relevant to the Brightwater project.

8.2.1.1 Regional Plans and Regulations

The Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act) (16 U.S. Code [U.S.C.] Chapter 12H; Public Law No. 96-501) was passed in 1980 and amended in 1996-97. The intent of the law is to promote and support:

- Conservation and efficiency in the use of electrical power
- Development of renewable resources within the Pacific Northwest
- Adequate, efficient, economical, and reliable power supplies for the region
- Orderly planning for regional power systems
- Development of regional plans and programs related to energy conservation; renewable resources; and protection, mitigation, and enhancement of fish and wildlife resources

This law includes specific requirements for utilities to undertake energy conservation programs, pay for mitigation of impacts caused by power transmission and distribution, and develop renewable resources as part of their overall resource mix. It also established the Northwest Power Planning Council (NPPC) as the regional planning agency for Idaho, Montana, Oregon, and Washington. The NPPC goals, as defined by the Northwest Power Act, are to work cooperatively with the states to manage the hydroelectric generating capacity and natural resources of the Columbia River Basin as well as other regional energy systems.

The NPPC's energy planning for the region is guided by the *Northwest Conservation and Electric Power Plan*, now in its fourth revision (the fifth version of the plan is currently under development). The plan includes detailed recommendations and strategies for furthering already active conservation programs by state and local governments, for ensuring research and development (as well as implementation and funding) of renewable energy resources, and for protecting the environment from impacts associated with electric power generation.

8.2.1.2 State Regulations

The Washington State Energy Code (Chapter 19.27A RCW) was adopted in 1990. Its intent was to establish building standards that bring about the common use of energy-efficient building methods and to assure that such methods remain economically feasible and affordable.

The energy code is designed to require new buildings to meet a certain level of energy efficiency while allowing flexibility in building design, construction, and heating equipment efficiencies within that framework. The standards of the energy code primarily dictate requirements for building insulation and fuel efficiency for heat sources.

8.2.1.3 Local Regulations and Policies

Local Building Codes

The building codes of local jurisdictions include energy-efficiency standards for residential and nonresidential buildings. Similar to state regulations, these standards also dictate requirements for building insulation and fuel efficiency for heat sources. Under state law, all local jurisdictions must adopt the requirements of the Washington State Energy Code, although the code allows for local standards to prevail if they are more restrictive than the state standards.

King County Administrative Policies and Procedures

King County (County) has established a number of policies and procedures related to energy. These policies and procedures are applicable to this project because they establish guidelines for how the County achieves energy efficiency in the construction and operation of projects it undertakes. Three King County policies are summarized below, including Energy Motion 11712; the executive policy on energy efficiency, conservation, and cost savings; and the Green Building Initiative.

Energy Motion 11712

Energy Motion 11712, passed by the King County Council on September 8, 2003, establishes the policy direction for leveraging the energy potential of King County's asset base and waste streams. The objective of Energy Motion 11712 is to increase revenues, reduce operating costs, and capture untapped energy resources from King County's waste streams in an environmentally conscious manner (King County, September 8, 2003). The policy specifically mentions King County's desire to reuse digester gas to recover energy and adopt sustainable design and development as a guiding principle, including obtaining certification for new buildings using the Leadership in Energy and Environmental Design (LEED™) rating system.

Energy Efficiency, Conservation, and Cost Savings

The executive policy on Energy Efficiency, Conservation, and Cost Savings (King County Executive Policy, FES 9-2, December 8, 1998) advocates using energy efficiently, reducing King County energy costs, and benefiting environmental quality through a number of measures:

- Ensuring that new and existing King County facilities are designed, maintained, and upgraded, as required, to be energy efficient based on life cycle evaluations

- Where practical, negotiating favorable rates for electricity, natural gas, and liquid fuel for King County facilities and prioritizing those efforts toward maximum benefit at high-use facilities
- Developing cost-effective alternative energy sources or fuel forms
- Implementing and maintaining energy conservation efforts within King County facilities and operations
- Monitoring energy policy, development, and supply markets for their effect on present and future energy costs
- Ensuring reliable supplies of essential energy forms to meet operating requirements
- Exploring partnership arrangements with other local jurisdictions and/or private businesses to gain access to improved power rates

Green Building Initiative

The Green Building Initiative (King County Executive Policy FES 9-3, October 25, 2001) encourages and promotes the use of “green building practices” in all buildings King County constructs, remodels, and renovates. Green building practices include practices that conserve resources, maximize the use of recycled materials, minimize energy consumption, and consider environmental, economic, and social benefits in the design and construction of a building project. The initiative directs King County offices and departments to incorporate or support the use of LEED™ methods and techniques into construction of facilities; it also establishes a Green Building Team to educate and guide departments in green building practices.

The LEED™ rating system is a performance-based system designed for rating new commercial, institutional, and high-rise residential buildings. Credits are earned for satisfying various criteria. Different levels of green building certification are awarded based on the total credits earned (U.S. Green Building Council, n.d.).

8.2.1.4 Regional Availability of Energy

Provided below is a summary of existing energy resources at the Unocal and Route 9 sites and along the conveyance routes for each system alternative.

Both alternative treatment plant sites are located in Snohomish County. The electrical energy providers for the treatment plant and conveyance system would be Snohomish Public Utility District (Snohomish PUD), Puget Sound Energy (PSE), and Seattle City Light. Snohomish PUD would serve both the Route 9 and Unocal sites. The portal siting areas would be served by either Snohomish PUD (if in Snohomish County) or PSE and Seattle City Light (if in King County).

Snohomish Public Utility District

Snohomish PUD currently provides electrical service to 271,200 customers, more than 90 percent of which are residential customers. Commercial and industrial customers make up only about 10 percent of the utility's customer base but account for approximately 40 percent of the total electricity demand (Snohomish County PUD, 2001).

The 2,200-square-mile Snohomish PUD Service Area includes all of Snohomish County and Camano Island in Island County. Currently, the Snohomish PUD purchases about 77 percent of its power from the Bonneville Power Administration (BPA) and the remainder from short-term contracts and environmentally friendly sources, including the Jackson Hydroelectric Project, the Everett Cogeneration Project, and the Klickitat County PUD's Landfill Gas Project. The utility's annual average demand is approximately 800 megawatts (MW) (Williams, personal communication, 2002).

Puget Sound Energy

PSE supplies electricity to residents and businesses in King County outside of the cities of Seattle, Lake Forest Park, Burien, SeaTac, Tukwila, and Shoreline. PSE also is the sole provider of natural gas to both alternative treatment plant sites. As of the end of 2001, PSE served 932,000 electric customers and 606,000 gas customers, approximately 90 percent of which are residential users (Puget Sound Energy, 2002). The service area covers 6,000 square miles, principally in the Puget Sound region.

PSE has peak electrical power resources of 4,970 megawatts (MW). Thirty-six percent of the power is supplied by 10 hydroelectric, oil/gas, and coal-powered facilities that the utility owns in Washington and Montana. Another 15 percent is obtained through long-term hydroelectric contracts with the public utility districts on the Columbia River, and the remainder is obtained through open market purchases.

PSE does not have any natural gas production facilities. Gas supply is purchased through short- and long-term contracts with gas providers throughout the United States and Canada.

Seattle City Light

Seattle City Light is the City of Seattle's municipal electric utility (Seattle City Light, 2001). The utility also provides electrical services to the cities of Shoreline, Lake Forest Park, Burien, SeaTac, and Tukwila. The utility serves 350,000 customers in a 131-square-mile area. Ninety percent of Seattle City Light customers are residential.

Seattle City Light owns seven hydroelectric projects in Washington. The production from these projects provides Seattle City Light with 1,888 MW of generation capacity. This supply provides 80 percent of the system demand; the remaining 20 percent is obtained through contracts with the BPA.

8.2.2 Affected Environment: Route 9 System

8.2.2.1 Treatment Plant: Route 9

The Route 9 site is located north of the City of Woodinville in unincorporated Snohomish County. The Snohomish PUD has indicated that they can provide service to the Brightwater Treatment Plant via two 115-kV transmission lines from the BPA SnoKing substation, which is located approximately 5 miles from the site (Krugel et al., 2003). Either transmission line could power the plant independently. The SnoKing substation is fed by multiple BPA lines and has redundant busses. Planned improvements in the future to the SnoKing substation will bring it to a level of reliability that is as high as can be practically attained from a power utility (Krugel et al., 2003).

The two transmission lines leaving SnoKing are the Parkridge and Clearview lines, which feed the Parkridge and Turners Corner substations, respectively. The Parkridge and Turners Corner lines are proposed to feed Brightwater. The Parkridge substation is located approximately 3 miles from the Route 9 site and the Turners Corner substation is located approximately 1 mile from the site. Based on the current load projections in the Southeast Snohomish County area, in 2005 the Snohomish PUD anticipates constructing a new 115-kV line (as an overbuild to an existing 12-kV line) from Turners Corner substation to the intersection of SR-9 and 228th Street SE. Here it will connect to an existing 115-kV line to the west, completing a tie between Park Ridge substation, BPA's SnoKing substation, and Turners Corner substation. This line is expected to pass adjacent to the Route 9 Brightwater Treatment Plant site. The project is documented in District Capital Construction Plans. This project has been and will continue to be coordinated with the Washington State Department of Transportation (WSDOT) State Route 9 road-widening project. (Williams, personal communication, 2003).

PSE would supply natural gas to the Route 9 site. A 6-inch-diameter, intermediate pressure (60 psig) gas supply line is located along 228th Street SE, which runs into the Route 9 site (Lewis, 2003) and supplies the Stock Pot Soup property. PSE has indicated that the Brightwater Treatment Plant could use the intermediate pressure pipeline to meet the plant's natural gas demands. (Lewis, 2003).

8.2.2.2 Conveyance: Route 9

Table 8-1 lists the substations closest to the portal siting areas along the influent portion of the Route 9 corridor. The influent portion would have permanent odor control and/or access facilities at the primary portals that would require power. Both primary and secondary portals are listed; however, it is unlikely that secondary portals would be used as construction portals. Because energy suppliers would not vary within the portal siting areas, candidate portal sites are not described individually.

Table 8–1. Electrical Substations Near the Portal Siting Areas on the Influent Portion of the Route 9 Corridors

Primary Portal Siting Area	Permanent Facility	Nearby Substation	Distance from Substation to Portal (miles)	Substation Owner
11	Odor Control Facility, Hydraulic structure	Kenmore	0.5	Puget Sound Energy
44	Odor Control Facility Hydraulic structure	Kenmore North Bothell	1.3 1.2	Puget Sound Energy
41	Odor Control Facility, Hydraulic structure, Influent Pump Station (Option)	Vitulli	0.5	Puget Sound Energy

Note: distances calculated from substation to center of Portal Siting Area following major roadways whenever possible. Actual distances will vary depending on location of portal within Portal Siting Areas.

Tables 8-2 and 8-3 list the substations closest to the portal siting areas along the 195th Street and 228th Street effluent corridors, respectively. As with the influent portions of the corridors, permanent facilities would be constructed at primary portals. Each permanent facility would require electricity. PSE would provide natural gas supply for all conveyance alternatives.

Table 8–2. Electrical Substations Near Portal Siting Areas on the Effluent Portion of the Route 9–195th Street Corridor

Portal Siting Area	Permanent Facility	Nearby Substation	Distance from Substation to Portal (miles)	Substation Owner
Primary Portals				
5	Odor Control Facility, Dechlorination facility	Mountlake Ballinger	1.9 1.6	Snohomish PUD
19	Sampling Facility, Transition Structure	Westgate	2.4	Snohomish PUD
Secondary Portals				
45	None	Kenmore	1.3	Puget Sound Energy
7	None	Shoreline	2.9	Seattle City Light
27	None	Ballinger	1.4	Snohomish PUD
23	None	Ballinger	2.2	Snohomish PUD

Note: distances calculated from substation to center of Portal Siting Area following major roadways whenever possible. Actual distances will vary depending on location of portal within Portal Siting Areas.

Table 8–3. Electrical Substations Near Portal Siting Areas on the Effluent Portion of the Route 9–228th Street Corridor

Portal Siting Area	Permanent Facility	Nearby Substation	Distance from Substation to Portal (miles)	Substation Owner
Primary Portals				
39	Access manhole	Parkridge	0.6	Snohomish PUD
33	Access manhole	Brier	1.2	Snohomish PUD
26	Odor Control Facility, Dechlorination facility	Ballinger	>0.1	Snohomish PUD
19	Sampling Facility, Transition Structure	Westgate	2.4	Snohomish PUD
Secondary Portals				
24	None	Westgate Maplewood	0.2 2.5	Snohomish PUD
22	None	Richmond Park	0.4	Snohomish PUD
37	None	Canyon Park	0.1	Snohomish PUD
30	None	Mountlake Brier	1.0 2.2	Snohomish PUD

Note: distances calculated from substation to center of Portal Siting Area following major roadways whenever possible. Actual distances will vary depending on location of portal within Portal Siting Areas.

8.2.2.3 Outfall: Route 9

The outfall would start at Portal Siting Area 19. PSE would provide natural gas, which may be used in addition to electricity during construction of the outfall. A small amount of electricity would be required during operations at Portal Siting Area 19 to run a sampling station; no natural gas would be required. Electrical transmission and distribution service for the portions of the outfall pipeline that would be constructed on land would be provided by the Snohomish PUD’s Westgate or Richmond Park 12.5-kV substation depending on its final location in the portal siting area.

8.2.3 Affected Environment: Unocal System

8.2.3.1 Treatment Plant: Unocal

The Unocal site is located in the City of Edmonds. Snohomish PUD’s-Halls Lake switching station is located approximately 4 miles from the site boundary. One example of possible separate and independent feeds from the Halls Lake switching station would be (1) a tap off the existing 115-kV transmission line north of Westgate substation, and

(2) a tap off the existing transmission line north of the Five Corners substation. These two transmission lines would feed the Unocal site. The major substation that feeds the Halls Lake switching station is the BPA SnoKing substation. BPA SnoKing is served from a BPA Monroe 500-kV line and auxiliary feeds from the Seattle City Light Bothell-Maple Valley 230-kV lines. The Halls Lake switching station is the only District 115-kV source in this area of the county and has three separate feeds from SnoKing and a fourth from the Paine Field substation. The configuration of Halls Lake switching station ensures that an outage on one 115-kV line allows the remaining lines to remain energized. The SnoKing substation is located approximately 10 miles from the site. Additional details of the SnoKing substation are described in the Affected Environment: Route 9 system above.

PSE would supply natural gas to the Unocal site. A 4-inch-diameter, intermediate pressure (60 psig) gas supply line runs along Third Avenue South and Dayton Street, which is within 0.5 mile of the Unocal site. PSE has indicated that the Brightwater Treatment Plant could use the intermediate pressure pipeline to meet the plant's natural gas demands. (Lewis, 2003).

8.2.3.2 Conveyance: Unocal

Electrical service providers vary along the conveyance corridors. The substations closest to the Portal Siting Areas along the Unocal corridor are listed in Table 8-4. Each of the substations would be within 2 miles of the Portal Siting Areas. Electricity would be required to operate the construction equipment as well as provide nighttime lighting. In addition, electrical service would be required to power any permanent odor control and/or access facilities constructed at the portals and to power the pump station at Portal 11. Puget Sound Energy would provide natural gas supply for constructing and operating the Unocal conveyance facilities.

8.2.3.3 Outfall: Unocal

The outfall would begin at the Unocal site. Electricity and possibly natural gas would be used during the construction of the outfall, but service would not be required once the outfall has been installed and is in operation. Electrical transmission and distribution service for the portions of the outfall pipeline that would be constructed on land would be provided by Snohomish PUD's Westgate or Maplewood 12.5-kV substations. PSE would provide natural gas supply, if needed, during construction. No natural gas would be required during operation.

Table 8–4. Electrical Substations Near Portal Siting Areas on the Unocal Corridor

Portal Siting Area	Permanent Facility	Nearby Substation	Distance from Substation to Portal (miles)	Substation Owner
Primary Portals				
14	Odor Control Facility, Hydraulic structure	Vitulli	0.2	Puget Sound Energy
7	Odor Control Facility, Hydraulic structure	Shoreline	2.9	Seattle City Light
3	Access manhole	Ballinger	1.4	Snohomish PUD
11	Odor Control Facility, Hydraulic structure, Pump Station	Kenmore	0.5	Puget Sound Energy
Secondary Portals				
10	None	Kenmore	1.6	Puget Sound Energy
13	None	Wayne Norway Hill	0.8 1.9	Puget Sound Energy
12	None	Kenmore Wayne Inglewood	0.9 1.0 1.2	Puget Sound Energy
5	None	Mountlake Ballinger	1.9 1.6	Snohomish PUD

Note: distances calculated from substation to center of the Portal Siting Area following major roadways whenever possible. Actual distances will vary depending on location of portal within the Portal Siting Areas.

8.3 Impacts and Mitigation

Energy requirements for electricity and natural gas use at the Brightwater Treatment Plant were estimated on the basis of current energy use at King County's West Point and South Treatment Plants and were adjusted to incorporate the Brightwater processes such as MBR and ballasted sedimentation. These estimates were refined using assumptions regarding conservation and efficiency measures that would be incorporated into the Brightwater project design to meet energy code requirements and comply with King County Energy Motion 11712, energy efficiency, and green building initiatives and policies. An alternative energy source, biogas, was also considered. Biogas would be used as a fuel to generate electricity or heat based on plant requirements.

Energy requirements for the conveyance facilities and outfall were determined by comparing existing King County facilities and using King County estimates of average wet- and dry-weather flow rates through the conveyance system for years 2010, 2020, 2030, and 2050. Energy-efficiency assumptions were also factored into these estimates. Pump efficiencies of 70 percent and motor efficiencies of 90 percent were used in the calculations.

8.3.1 Impacts and Mitigation Common to All Systems

8.3.1.1 Treatment Plant Impacts Common to All Systems

Construction Impacts Common to All Systems: Treatment Plant

Construction of the treatment plant, conveyance system, and outfall at either the Unocal or Route 9 site would require cranes, forklifts, hoists, welding machines, air compressors, and hand tools for excavation, dewatering, transporting material, and installing piping and equipment. Some of these tools use electricity as the power sources; others use gasoline or diesel fuels. In addition, electricity would be used to provide site lighting. This energy consumption would have no significant impacts on the local energy supply because local energy companies and petroleum companies assume some miscellaneous power consumption, due to activities such as construction, when they do their demand forecasting.

It is anticipated that the majority of the workers would be local. The fuel used to power the construction workers' vehicles would be used irrespective of their current project location; the construction workers' vehicles would have had a similar fuel demand prior to commencement of this construction project as during the project. Therefore, transportation of construction workers would have no significant impact on long-term energy use or generation

Operation Impacts Common to All Systems: Treatment Plant

Energy Consumption

The energy consumed during operation of the Brightwater Wastewater Treatment Plant would be for both process (treatment equipment) and non-process (e.g., building lighting, ventilation, and heating) usage. Most of the energy consumed by the treatment plant would be used to operate the process equipment (e.g., pumps, mixers, thickening and dewatering equipment, etc.). Pumping requirements would consume approximately half of the total power required for the plant; the aeration blowers and odor control exhaust fans would also consume a large amount of energy. The remainder of the energy would supply power for smaller process requirements such as chemical pumps, sludge collectors, and conveyors and for nonprocess requirements such as lighting and heating.

The projected annual energy consumption (in megawatt-hours [MWh]) for operation of the Brightwater Treatment Plant at both the Unocal and Route 9 sites is shown in Table 8-5. Note that Table 8-5 is system energy consumption (treatment plant, conveyance and outfall) and includes influent and effluent pump stations (effluent pump station at Unocal only) as well as pump stations in the conveyance corridors (Unocal only). For reference, one single-family home uses approximately 12,000 kilowatt-hours (kWh) of electricity per year; therefore, 50,000 MWh is approximately enough power for 4,200 homes for 1 year.

Energy Sources

National Pollutant Discharge Elimination System (NPDES) discharge permits require King County to prevent the release of untreated wastes during a power failure either by means of alternative power sources, standby generator, or retention of inadequately treated wastes. The Brightwater Wastewater Treatment Plant would provide dual-feed electrical service for redundancy and reliability.

Snohomish PUD would supply electrical energy to each site using two independent 115-kV electrical feeders. A dual high-voltage substation would be located onsite to step down the voltage from 115 kV to 15 kV (or 12.5 kV) for distribution to the plant substation. The plant substation would further reduce the voltage for use throughout the plant. Both onsite substations would have dual feeds and automatic switch gear to provide continuous electrical power in the event of failure of one of the feeders.

Table 8–5. Estimated Gross Annual Energy Consumption of a Treatment Plant at the Route 9 Site or Unocal Site

	Gross Annual Energy Consumption (MWh)		
	36-mgd	**54-mgd**	**72-mgd**
Route 9 Site			
Plant influent pumping [a]	11,000 to 16,000	13,000 to 19,000	Not Applicable [e]
Plant w/ MBR split flow treatment [b]	34,000 to 48,000	47,000 to 67,000	Not Applicable [e]
Ballasted sedimentation [c]	26	38	Not Applicable [e]
Reuse (w/UV disinfection) [d]	2,000 to 3,000	20,000 to 28,000	Not Applicable [e]
Total Route 9 Plant + Plant Influent Pumping + Reuse (Route 9 System Total)	**46,000 to 66,000**	**79,000 to 114,000**	**Not Applicable [e]**
Unocal Site			
Plant influent pumping + effluent pumping [a]	10,000 to 15,000	12,000 to 18,000	16,000 to 24,000
Plant w/ MBR split flow treatment [b]	35,000 to 50,000	48,000 to 68,000	60,000 to 86,000
Ballasted sedimentation [c]	40	56	72
Reuse (w/UV disinfection) [d]	2,000 to 3,000	20,000 to 28,000	20,000 to 28,000
Total Unocal Plant + Plant Influent and Effluent Pumping + Reuse	**47,000 to 67,000**	**79,000 to 114,000**	**96,000 to 138,000**
Portal 11 Pump Station [f]	5,000 to 9,000	13,000 to 14,000	13,000 to 14,000 [g]
Unocal System Total	**52,000 to 76,000**	**92,000 to 128,000**	**109,000 to 152,000**

[a] Average annual consumption for pumping ranges from 15 percent to 20 percent of connected load (all equipment that is connected to a power source at the treatment plant).

[b] Average annual consumption for plant and reuse ranges from 35 percent to 50 percent of connected load (all equipment that is connected to a power source at the treatment plant).

[c] Frequency of ballasted sedimentation operations was assumed to be 25 events per year, 8 hours per event.

[d] For 5-mgd reuse plant at a flow of 36 mgd and 54-mgd reuse plant at a flow of 54 mgd and 72 mgd.

[e] No 72-mgd plant is proposed for the Route 9 site.

[f] Energy consumption shown for new Brightwater conveyance pump station at Portal Siting Area 11. Energy consumption at other permanent facilities assumed to be very low compared to wastewater pumping. Existing conveyance facilities not included in analysis.

[g] The increased flow for the 72-mgd alternative enters the system after Portal 11.

Energy recovery of biogas would reduce the need for outside energy sources. The estimated energy recovery potential for both sites is shown in Table 8-6.

Table 8–6. Estimated Biogas Production and Energy Recovered from a Treatment Plant at the Route 9 or Unocal Site

Flow Rate (mgd)	Biogas Production (cfm)	Annual Energy Recovered (MWh)
36	265	6,000
54	398	9,000
72 [a]	530	12,000

[a] For Unocal only. No 72-mgd plant is proposed for the Route 9 site.
cfm = cubic feet per minute

The projected net energy consumption for both sites, assuming that all the biogas shown in Table 8-6 would be used to produce energy, is shown in Table 8-7.

Table 8–7. Estimated Net Annual Energy Consumption (After Energy Recovery) of a Treatment Plant at the Route 9 or Unocal Site

	Net Annual Energy Consumption After Energy Recovery (MWh)		
	36mgd	**54mgd**	**72mgd**
Route 9 Site			
Total Plant + Plant Influent Pumping + Reuse	40,000 to 60,000	70,000 to 105,000	Not Applicable[a]
Unocal Site			
Total Plant + Plant Influent and Effluent Pumping + Reuse	41,000 to 61,000	70,000 to 105,000	84,000 to 126,000

[a] No 72-mgd plant is proposed for the Route 9 site.
mgd = million gallons per day

The energy required to run the 36-mgd plant after energy recovery is equal to the energy required by approximately 3,300 to 5,000 homes per year (assuming 12,000 kWh/year per household).

Backup Power

An energy generation facility would be located at each treatment plant site to provide sufficient power to run the entire treatment facility (including the pump stations) at average wet weather flow (AWWF) capacity in the event the dual-feed electrical feed was not available. The energy generation facility would use biogas and natural gas and would contain gas turbines, reciprocating engines, and/or fuel cells. Under normal conditions only biogas would be used and only a portion of the energy generation facility would operate. If electricity were not available then natural gas would be used to augment the biogas and run the energy generation facility at full capacity. The capacity of the generation facility would be approximately 7 MW for the 36-mgd plant, 13 MW for the 54-mgd plant, and 16 MW for the 72-mgd plant (Unocal only). Some heat recovery would be potentially available from the energy generation facilities, but was not quantified or considered in this analysis.

A natural gas-fired hot water boiler (250-hp unit) would be used to heat the treatment plant buildings for 8 months of the year (the winter heating season). A standby internal combustion generator operating on diesel fuel would also be provided to provide for critical life safety requirements (lighting, for example) and to start the cogeneration turbines. One generator would be provided for the 36-mgd plant and two 250 kW generators would be provided for the 54-mgd and 72-mgd plant.

Impacts of Regional Energy Consumption

Environmental impacts could potentially occur from an increase in regional electrical consumption. Increased electrical loads could require the acquisition of new generation equipment and resources as well as new transmission facilities by the energy provider(s). The impacts of regional energy generation vary depending on the type of energy generation that the energy provider would use to generate the additional energy required to meet the demand for the Brightwater Treatment Plant and a growing regional population. This increase in demand could increase costs to the energy provider and its consumers.

Construction of new transmission lines and the substations located at the plant site would be required. Costs of energy generation facilities and any work required to connect the proposed project to the existing facilities owned by regional energy providers would be in accordance with applicable policies and could require customer cost sharing through increased rates.

The new transmission and distribution lines would follow existing roads and rights-of-way to the greatest extent possible to minimize impacts. In general, the impacts would be similar to other construction projects such as street disruption, temporary utility construction, minor vegetation losses, noise, and dust. As the form and location of specific energy facilities is determined in the design process, appropriate environmental review would be conducted as needed.

Impacts of Energy Recovery

Energy would be recovered from the biogas at the Brightwater Treatment Plant. Cogeneration gas turbines, fuel cells, or reciprocating engines would use the biogas to reduce the quantity of energy purchased from the Snohomish PUD. Energy recovery from biogas is commonly practiced at wastewater treatment plants and is currently being used at King County's South and West Point Treatment Plants. At the West Point Treatment Plant, electrical energy is generated using engine generators to burn biogas. Biogas is also burned to operate pumps. At the South Treatment Plant, the biogas is cleaned in wet scrubbers, and the resulting "pipeline" quality gas produced is sold to PSE. Biogas cleaned to pipeline quality can also be used as compressed natural gas for vehicle fuel. The South Treatment Plant is also planning to use biogas to produce energy using a fuel cell. A 1.0 MW fuel cell is currently being installed at King County's South Treatment Plant. The fuel cell will be tested on both digester gas and natural gas during a 2-year demonstration period from the fall of 2003 through the fall of 2005.

Impacts of the Brightwater energy recovery facilities would vary depending on the energy generation equipment chosen. In general, the major impacts would be air emissions and noise. The air and noise emissions would vary depending on the equipment. The equipment would have air emission and noise mitigation equipment installed as required to comply with regulations and local jurisdictions.

Proposed Mitigation Common to All Systems: Treatment Plant

Sustainability and Energy Efficiency Measures

As described in the section titled Local Regulations and Policies (King County Administrative Policies and Procedures), the Brightwater facilities would be designed to incorporate or support the use of LEED™ methods. Examples of energy conservation criteria that may be incorporated into Brightwater to achieve LEED™ certification include:

- Spreading out peak energy use to the maximum extent possible to reduce costly peak demand and peak generating capacity
- Maximizing heating insulation
- Designing instrumentation and control systems to optimize heating and pumping
- Specifying motors and other power equipment with the lowest practicable energy consumption for the required level of performance and high efficiency
- Illuminating interiors by natural light to the greatest extent possible, and incorporating glazing and other measures to improve the insulating qualities of windows
- Locating processes to maximize gravity flow and reduce pumping

8.3.1.2 Conveyance Impacts Common to All Systems

Construction Impacts Common to All Systems: Conveyance

Conveyance construction impacts are similar to the impacts described for the treatment plant. Varying lengths of electrical transmission line would be required. The impacts of installing the transmission line could include street disruption, temporary utility construction, minor vegetation losses, noise, and dust. As the form and location of specific energy facilities are determined in the design process, appropriate additional environmental review will be conducted as needed.

Tunnel Boring Machines (TBMs) are capable of excavating tunnels at fairly high advance rates; however, they require a significant amount of power for operation. As a result, the bulk of the power required at the individual portal locations during construction will be utilized during the tunnel excavation phase.

The primary portals on the project can be classified as two separate types depending upon their anticipated function: launching and receiving. Launching portals will provide support for the construction of one or more tunnel drives, including launching of the TBMs, ongoing operation of the TBMs for the length of the tunnel section, and the removal of excavated materials. Receiving portals will be used to remove one or more TBMs at the completion of a tunnel drive. Due to the TBM operations, launching portals will require significantly more power than receiving portals.

The type of TBMs required to excavate the tunnels has not been determined, but it is assumed that either an Earth Pressure Balance (EPB) or Slurry Shield TBM will be used. Single effluent and influent tunnels are assumed to require 14-foot-diameter TBMs, while the combined influent/effluent tunnel (between Portal 44 and the Route 9 site) would require a 24-foot-diameter TBM. Power requirements are based upon the TBM’s horsepower rating. For a 14-foot EPB or Slurry Shield TBM, the estimated total power requirement would vary between 1,250 and 1,500 kW, while a 24-foot TBM would require between 2,500 and 2,650 kW. These values reflect the total power requirement for the TBM cutterhead operation and its associated trailing gear (which would include segment erection, screw conveyor, grouting operations, and lighting). It does not include the slurry circuit booster pumps, which would require between 600 and 1,800 kW depending on the drive length and required excavated tunnel diameter. Energy consumption for the tunnel boring process is included in the sections titled Construction Impacts: Route 9 Conveyance and Construction Impacts: Unocal Conveyance.

In addition to the power required for operation of the TBM(s), each portal would require additional power for auxiliary equipment in both the tunnel and on the surface. This auxiliary equipment would include tunnel, portal and surface lighting, tunnel and portal ventilation, dewatering sump pumps, muck hoists and pumps, man hoists, workshop equipment, and office facilities. This equipment would typically be the same regardless of the TBM type, although in the case of a Slurry Shield TBM, a slurry separation plant would be required above-ground.

Electrical power for construction of each of the portals could be supplied from local power lines or from a line from the nearest substation (as shown in Tables 8-1 through 8-4). In some cases, a substation may be constructed at the site or diesel generators could be used to produce electricity at the portal, but only if local power lines or nearby substations were unavailable.

Operation Impacts Common to All Systems: Conveyance

The operation of new pump stations and permanent facilities along all conveyance routes would require the use of electrical energy to power pumps, fans, control systems, lighting, and other equipment. NPDES discharge permits require the prevention of untreated wastewater discharges during a power failure either by means of alternative power sources, standby generator, or retention of inadequately treated wastes. The pump stations would have dual-feed electrical service for redundancy and reliability. Standby diesel generators would also be installed at the Portal 11 pump station (Unocal alternative only) to provide continued service in the event of a failure of both electrical feeds. There are no pump stations in the Route 9 conveyance system without the IPS option at Portal 41. The Portal 41 IPS option is discussed under Operation Impacts: Route 9 Conveyance. The predicted energy consumption for the Portal 11 pump station is shown in Table 8-5.

The existing electrical infrastructure in the vicinity of the pump station and portal locations is generally adequate to handle the predicted loads from any permanent facilities. However, the infrastructure in some areas may require upgrades and/or new construction to meet the requirements of the new facilities.

The use of standby generators during power outage situations could result in the consumption of diesel fuel. Such usage would be short-term and intermittent and is not expected to create significant additional demand for diesel fuel in the project area because the quantity of diesel fuel used would be small and its use would be infrequent.

Proposed Mitigation Common to All Systems: Conveyance

Measures to minimize energy use at any pump station and permanent facilities would be similar to those identified above for the treatment plant sites. In addition, during the design process, the configuration of the conveyance system will be optimized to achieve the most effective balance between peak pumping requirements and storage of wastewater flows. Minimizing peak pumping requirements would result in lower energy usage in the system. Design and planning will consider factors related to the overall sustainability of facility construction and operation, including energy performance and conservation.

8.3.1.3 Outfall Impacts Common to All Systems

Construction Impacts Common to All Systems: Outfall

Outfall construction impacts are similar to the impacts described for the treatment plant. Also required for in-water construction would be boats (such as barges) and waterborne equipment for excavation and placement of the outfall and diffuser. Some of these tools use electricity as a power source; others use gasoline or diesel fuels. This energy consumption would have no significant impacts on local energy supply because local energy companies assume some miscellaneous power consumption, due to activities such as construction, when they do their demand forecasting.

Operation Impacts Common to All Systems: Outfall

The effluent pump station at the Unocal site and the elevation of the Route 9 site would provide sufficient force, or “head,” to convey flows out the outfall and through the diffuser. The projected power consumption for the Unocal effluent pump station is included in Table 8-5.

Proposed Mitigation Common to All Systems: Outfall

No mitigation is required for the outfall zones because no energy impacts are anticipated.

8.3.2 Impacts and Mitigation: Route 9 System

8.3.2.1 Treatment Plant: Route 9

Construction Impacts: Route 9 Treatment Plant

Some general construction impacts for the Route 9 site are discussed under Impacts and Mitigation Common to all Systems above. Site-specific impacts are described below.

Energy for the treatment plant cogeneration facility would be supplied by natural gas and biogas. The plant could be served from the existing intermediate-pressure (60-psig) system on a firm or interruptible basis and no additional pipeline would need to be constructed.

As discussed under Impacts and Mitigation Common to All Systems, an onsite 115-kV substation would be required to take the 115-kV transmission level voltage down to the treatment plant’s distribution level voltage. In addition, a 12.5 (or 15-kV) substation would be provided on the plant site to reduce or step down the transmission line voltage to the voltage that would be used throughout the plant.

As discussed under Affected Environment for Route 9, approximately 1.0 mile of new electrical line would be required from the Turners Corner substations to the plant site. The line from Parkridge is already installed. To install the new 115-kV line and account for the Route 9 road widening planned by WSDOT, the new line (and the existing 12-kV line) would be moved approximately 30 feet to the east of the existing alignment. The poles would be approximately 80 feet high and include the 115-kV lines on top with the 12-kV lines below them on the same poles. The poles would be either wood or steel. The impacts of installing these transmission lines would be similar to those described above for the gas pipeline, but may be less because the transmission line would be overhead instead of underground. Construction required would be augering (8 to 9 feet into the ground) at the pole locations (approximately every 300 feet) and minor concrete and earth work at each pole location. Existing utilities would also likely require relocation. Impacts include temporary roadway disruption, localized increases in dust during the construction period, small losses of vegetation in areas outside developed rights of way, and a slight change from the current visual conditions. Additional discussion of these impacts is provided in Chapter 7, 12, and 17, however, mitigation measures are anticipated to reduce impacts to a level of non-significance.

Operation Impacts: Route 9 Treatment Plant

Operational impacts include the use of equipment and facilities that require energy such as process equipment, pumps, lighting, heating, and ventilation systems. Tables 8-5 and 8-7 show gross and net annual energy consumption for components located at the plant sites.

Proposed Mitigation: Route 9 Treatment Plant

Mitigation for the Route 9 site is discussed under Impacts and Mitigation Common to all Systems.

8.3.2.2 Conveyance: Route 9

Construction Impacts: Route 9 Conveyance

The potentially affected substations for the influent, 195th Street, and 228th Street corridors are listed in Tables 8-1 through 8-3. Varying lengths of electrical transmission line would be required as shown in Tables 8-1 through 8-3. Electric transmission line construction and tunneling impacts are described above in Conveyance Impacts Common to All Systems. The annual average energy consumption by the tunnel boring machines is shown in Table 8-8.

Table 8–8. Approximate Annual Energy Consumption of Tunnel Boring Machines for Construction in Route 9 Corridors (2005–2010)

Corridor	Annual Energy Consumption (MWh)					
	2005	2006	2007	2008	2009	2010
195th Street	1,000	12,000	56,000	77,000	27,000	4,000
228th Street	0	10,000	58,000	81,000	34,000	2,600

Operation Impacts: Route 9 Conveyance

There are no new pump stations currently proposed outside of the treatment plant for the Route 9 corridors. A potential option to relocate the influent pump station to Portal 41 is discussed below. Power consumption associated with permanent tunnel access, odor control, chemical feed, and/or ventilation facilities is assumed to be very low.

Portal 41 Influent Pump Station Option

The average annual energy consumption of the Influent Pump Station (IPS) at Portal 41 is estimated to be 15,000 MWh per year for the 36-mgd plant and 17,000 MWh per year for the 54-mgd plant. This is similar to the estimated energy consumption of 11,000 to 16,000 MWh per year for the onsite IPS at the 36-mgd plant and 13,000 to 19,000 MWh per year for the onsite IPS at the 54-mgd plant.

A 115-kV electrical substation would be installed at the IPS at Portal 41. The IPS would have dual-feed electrical service for redundancy and reliability from the Vitulli substation and the North Bothell substation. Standby diesel generators would also be installed at the IPS to provide continued service in the event of a failure of both electrical feeds. Energy consumption for construction of the IPS would be minimal.

Proposed Mitigation: Route 9 Conveyance

Mitigation for the Route 9 conveyance is discussed under Impacts and Mitigation Common to all Systems.

8.3.2.3 Outfall: Route 9

Impacts and mitigation for the Route 9 outfall are discussed under Impacts and Mitigation Common to all Systems.

8.3.3 Impacts and Mitigation: Unocal System

8.3.3.1 Treatment Plant: Unocal

Construction Impacts: Unocal Treatment Plant

Some general construction impacts for the Unocal site are discussed under Impacts and Mitigation Common to all Systems above. Site-specific impacts are described below.

Energy for the cogeneration facility would be supplied by natural gas and biogas. Approximately 0.5 mile of 4-inch-diameter, intermediate-pressure natural gas pipe would need to be constructed by PSE to bring natural gas from Third Avenue South and Dayton Street. The impacts of installing this pipeline would be similar to those of installing an underground electrical transmission line and could include street disruption, temporary utility construction, minor vegetation losses, noise, and dust. As the form and location of specific energy facilities are determined in the design process, appropriate additional environmental review will be conducted if needed.

As discussed under Impacts and Mitigation Common to All Systems, an onsite 115-kV substation would be required to take the 115-kV transmission level voltage down to the treatment plant’s distribution level voltage. In addition, a 12.5-kV (or 15-kV) substation would be provided on the plant site to reduce or step down the transmission line voltage to the voltage that would be used throughout the plant.

As discussed under Affected Environment for Unocal, approximately 4 miles of new 115-kV electrical line would be required, 2 miles from the Westgate substation (along Edmonds Way) and 2 miles from the Five Corners substation (along Walnut Street) to the plant site. The transmission lines to the Unocal site would be installed underground due to requirements imposed by the City of Edmonds and the Town of Woodway. Construction would occur in approximately 200-foot segments, minimizing disruption to the surrounding community. A typical underground 115-kV transmission line trench is expected to be approximately 5-1/2 feet deep and 3 feet wide. Separate trenches would be required for each line. Shoring would likely be required and vaults (12 feet by 10 feet by 5-1/2 feet deep) would be constructed approximately every 1,000 feet to pull the cable from one vault to the next. Intersections would be crossed using directional drilling underground. Utilities would likely require relocation along the transmission route (Williams, 2003). Placing the transmission lines underground would cause temporary traffic disruption, noise, and dust during construction similar to installation of a natural gas pipeline, however, mitigation measures are anticipated to reduce impacts from construction and the impacts could be mitigated to a level of non-significance. As the form and location of specific energy facilities are determined in the design process, appropriate additional environmental review would be conducted if needed.

Operation Impacts: Unocal Treatment Plant

Operational impacts include the use of equipment and facilities that require energy such as process equipment, pumps, lighting, heating, and ventilation systems. Tables 8-5 and 8-7 show gross and net annual energy consumption for components located at the plant sites.

Unocal 72-mgd Sub-Alternative

Operational impacts of this sub-alternative would be additional energy consumed by the 72-mgd facilities, as shown in Tables 8-5 and 8-7.

Unocal Structural Lid Sub-Alternative

Operational impacts of the treatment plant with the multimodal facility would be the same for the treatment plant as described for the base alternative plus the addition of the multimodal energy uses. The energy use of the multimodal facility was evaluated as part of the Edmonds Crossing environmental review process. Based on this review, very little additional energy use would be expected directly by the Edmonds Crossing project.

Proposed Mitigation: Unocal Treatment Plant

Mitigation for the Unocal treatment plant is discussed under Impacts and Mitigation Common to all Systems.

8.3.3.2 Conveyance: Unocal

Construction Impacts: Unocal Conveyance

The potentially affected substations for the Unocal conveyance system are listed in Table 8-4. Varying lengths of electrical transmission line would be required as shown in Table 8-4. For the Unocal site's influent tunnel, a new 170-mgd pump station would be constructed at Portal Siting Area 11. This new pump station would be able to draw power from two different substations, the nearest being PSE's Kenmore and Inglewood substations. A transmission line would also be required from either the Kenmore substation (0.5 mile) or the Inglewood substation (2 miles). Energy consumption during the construction of the pump station would be minimal. Electric transmission line construction and tunneling impacts are described above under Conveyance Impacts Common to All Systems. Tunneling impacts are described in Conveyance Impacts Common to All Systems. The annual average energy consumption by the tunnel boring machines is shown in Table 8-9.

Table 8–9. Approximate Annual Energy Consumption of Tunnel Boring Machine in the Unocal Corridor (MWh)

2005	2006	2007	2008	2009	2010
5,000	8,000	40,000	54,000	21,000	1,500

Operation Impacts: Unocal Conveyance

There would be a new pump station at Portal Siting Area 11. The pump station would require power associated with permanent tunnel access, odor control, chemical feed, and/or ventilation facilities. This power demand for the pump station is shown in Table 8-5.

Each of the portals listed in Table 8-4 could have some equipment that requires electricity, but the electrical consumption would be low and less than the pump station at Portal Siting Area 11.

Proposed Mitigation: Unocal Conveyance

Mitigation for the Unocal conveyance system is discussed under Impacts and Mitigation Common to all Systems.

8.3.3.3 Outfall: Unocal

Impacts and mitigation for the Unocal outfall are discussed under Impacts and Mitigation Common to all Systems.

8.3.4 Impacts: No Action Alternative

Under the No Action Alternative, treatment and conveyance facilities associated with the Brightwater System would not be constructed and therefore would not consume energy. However, the wastewater treatment needs of people in north King County and south Snohomish County would have to be addressed by capacity solutions other than the Brightwater System. No action would require the existing treatment plants to attempt to treat the same volume of wastewater that would have gone to Brightwater, though overflows would likely occur at low points in the system during periods of high flows. The energy consumption would be the same as, or less than, the Brightwater System because fewer (and larger) pieces of treatment equipment would be in operation. However, in the absence of Brightwater, flows currently proposed to flow to the Brightwater Wastewater Treatment Plant would need to be pumped in the conveyance system to either the South Treatment Plant or the West Point Treatment Plant and then pumped into and out of each plant. Portions of the Brightwater conveyance system would flow by gravity and would have lower energy requirements than the existing system. However, energy requirements for pumping influent (Route 9 and Unocal) and effluent pumping (Unocal) would likely be greater for the Brightwater System than for the No Action Alternative. Therefore, the Brightwater alternative would require greater energy consumption than the No Action Alternative.

8.3.5 Cumulative Impacts

Urbanization of the Brightwater service area will result in increasing energy needs. Within the Route 9 site area, no major projects have been identified that would result in significant energy use beyond the identified capacities of the local energy providers. Other developments proposed in the Unocal site area would add to the cumulative use of energy in the region. In particular, if the Edmonds Crossing multimodal facility is developed, it would involve consumption of electrical energy for lighting and equipment for the terminal. However, this is not expected to be a significant impact. The consumption of fuel for different types of vehicles that would use the multimodal facility currently occurs at other locations in Edmonds and would just be transferred to the new terminal location. Cumulatively, continued development of new or more intensive land uses would result in additional needs for energy-generating resources, creating the types of impacts described previously under Impacts of Regional Energy Consumption.

8.4 Significant Unavoidable Adverse Impacts

Energy use in the project area during the construction of the conveyance system would temporarily increase to up to 89,000 MWh per year during the period 2005 to 2010. Net energy use in the project area would increase by up to 105,000 MWh per year as a result of the need to provide power for operation of the 54-mgd Brightwater treatment and conveyance facilities. This quantity of energy consumption, as stated in the No Action Alternative, is unavoidable and would be required at other facilities to convey and treat the wastewater flows that would otherwise be conveyed to and treated by Brightwater. Brightwater, therefore, does not represent a significant unavoidable adverse impact. No new power sources would be required. Construction of additional electrical transmission lines and gas pipelines would be required but would not present significant adverse environmental impacts.

8.5 Summary of Impacts and Mitigation

Table 8-10 provides a summary of potential energy impacts and mitigation measures for the Brightwater System alternatives.

Table 8–10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation for Brightwater Systems

Brightwater System	System Component	Impacts	Mitigation
Common to All Systems	Treatment Plant	Construction • Equipment used for construction and worker transportation to the site would require external power sources such as electricity and gasoline or diesel fuels. This energy consumption would have no significant impacts on local energy supply because local energy and petroleum companies assume some miscellaneous power consumption, due to activities such as construction, when they do their demand forecasting. • Snohomish PUD would have to improve electrical service to either site. Overhead or buried service extensions from existing lines or substations would be conducted by the PUD, and could cause temporary construction-related dust, noise, and traffic disruption.	Construction • None • Dust, noise, and traffic disruption would be minimized to the extent possible.

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
Common to All Systems (cont.)	Treatment Plant (cont.)	Operation • The net energy consumption (after energy recovery from digester gas), including the influent pump station, would be 105,000 MWh per year for a 54-mgd plant.	Operation • Digester gas (biogas) would be used to generate electricity or fuel boilers to provide heat for process and building heating requirements. This would reduce the need for electricity. The estimated annual energy recovery potential from digester gas is 9,000 MWh at 54-mgd capacity. • The Brightwater facility would be designed to incorporate or support the use of LEED™ methods. Design and planning will consider factors related to the overall sustainability of facility construction and operation, including optimizing energy performance. For example, design would include high-efficiency pumps, use of renewable energy sources such as digester gas, and reduced energy use required for heating and building lighting through sustainable architectural design and location of processes to maximize gravity flow and reduce pumping.
	Conveyance	Construction • Equipment used for construction would require external power sources such as electricity and gasoline or diesel fuels. Tunnel Boring Machines can tunnel at advanced rates; however, they require a significant amount of power for operation. Consequently, the bulk of power at portal sites will be consumed during the tunnel excavation phases. The tunnel boring machines would consume up to 89,000 MWh/yr during 2005 to 2010. • Snohomish PUD, Seattle City Light, and PSE would have to provide overhead or buried electrical service to the portals from existing lines or substations. Service extension could cause temporary construction-related impacts, including noise, dust, and traffic disruptions.	Construction • Same as mitigation for treatment plant.

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
Common to All Systems (cont.)	Conveyance	Operation • The operation of any permanent facilities (odor control, ventilation, and/or tunnel access) would require use of electrical energy to power mechanical equipment and provide lighting. • In some cases, power infrastructure may require upgrading in order to provide adequate power to new facilities.	Operation • Measures to minimize energy use at permanent facilities through selection of energy efficient equipment and implementation of energy efficient operational practices.
	Outfall Zones	Construction • Equipment used for construction would require external power sources such as electricity and gasoline or diesel fuels. This energy consumption would have no significant impacts on local energy supply because local energy and petroleum companies assume some miscellaneous power consumption, due to activities such as construction, when they do their demand forecasting.	Construction • None
		Operation • The projected energy use of the Brightwater facilities is addressed under treatment plant impacts and conveyance system impacts. • The offshore portion of the outfall will operate by gravity flow and would not require the use of additional power.	Operation • No mitigation would be needed as there would be no energy use.
Route 9–195th Street System	Treatment Plant	Construction • Same as impacts Common to All Systems, above. • Impacts from the extension of the electric transmission line would include temporary roadway disruption, localized increases in dust during the construction period, small losses of vegetation in areas outside developed rights of way, and a slight change from the current visual conditions.	Construction • Same as mitigation Common to All Systems, above. • Mitigation measures for the extension of the electrical transmission line are anticipated to reduce impacts from construction and the impacts could be mitigated to a level of non-significance.

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
Route 9–195th Street System (cont.)	Treatment Plant	Operation • Same as impacts Common to All Systems, above.	Operation • Same as mitigation Common to All Systems, above.
	Conveyance	Construction • Same as impacts Common to All Systems, above. • Tunnel boring machine would consume 1,000 to 77,000 MWh/yr.	Construction • Same as mitigation Common to All Systems, above.
		Operation • Same as impacts Common to All Systems, above. • The only facilities requiring energy use in the conveyance system would be the odor control systems, lighting, and other miscellaneous equipment at the portals. There would be no pump stations in the conveyance system.	Operation • Same as mitigation Common to All Systems, above.
	Outfall	Construction • Same as impacts Common to All Systems, above.	Construction • Same as mitigation Common to All Systems, above.
		Operation • Same as impacts Common to All Systems, above.	Operation • Same as mitigation Common to All Systems, above.
Route 9–228th Street System	Treatment Plant	Construction • Same as impacts Common to All Systems, above.	Construction • See mitigation Common to All Systems, above.
		Operation • Same as impacts Common to All Systems, above.	Operation • Same as mitigation Common to All Systems, above.

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
Route 9–228th Street System (cont.)	Conveyance	<u>Construction</u> • Same as impacts Common to All Systems, above. • Tunnel boring machine would consume 3,000 to 89,000 MWh/yr.	<u>Construction</u> • Same as mitigation Common to All Systems, above.
		<u>Operation</u> • See impacts Common to All Systems, above. • The only facilities requiring energy use in the conveyance system would be the odor control systems, lighting, and other miscellaneous equipment at the portals. There would be no pump stations in the conveyance system.	<u>Operation</u> • Same as mitigation Common to All Systems, above.
	Outfall	<u>Construction</u> • Same as impacts Common to All Systems, above.	<u>Construction</u> • Same as mitigation Common to All Systems, above.
		<u>Operation</u> • Same as impacts Common to All Systems, above.	<u>Operation</u> • Same as mitigation Common to All Systems, above.
Unocal System	Treatment Plant	<u>Construction</u> • Same as impacts Common to All Systems, above. • The trenching required for construction of the Unocal dual-feed transmission lines would have impacts on the surrounding community, including dust and traffic disruptions. • Gas service from PSE would require extension of gas lines. The impacts would be similar to buried electrical transmission line construction.	<u>Construction</u> • Same as mitigation Common to All Systems, above. • Mitigation would include limiting road closures to the extent possible and wetting roads to control dust. Mitigation measures are anticipated to reduce impacts from construction and the impacts could be mitigated to a level of non-significance

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
Unocal System (cont.)	Treatment Plant	Operation • Same as operational impacts Common to All Systems for a 54-mgd plant. • The net energy consumption (after energy recovery from digester gas), including the influent pump station, would be 126,000 MWh per year for a 72-mgd plant.	Operation • Same as operation mitigation Common to All Systems for 54-mgd plant. • The estimated annual energy recovery potential from digester gas is 12,000 MWh at 72-mgd capacity.
	Conveyance	Construction • Same as impacts Common to All Systems, above. • Tunnel boring machine would consume 1,000 to 39,000 MWh/yr.	Construction • Same as mitigation Common to All Systems, above.
		Operation • Same as impacts Common to All Systems, above. • The net energy consumption for the Portal 11 pump station would be 13,000 to 14,000 MWh per year for both the 54-mgd and 72-mgd plants. There would be no other major facilities that require energy in the conveyance system. Minor facilities (e.g., odor control, etc.) would require some energy.	Operation • Same as mitigation Common to All Systems, above.
	Outfall	Construction • Same as impacts Common to All Systems, above.	Construction • Same as mitigation Common to All Systems, above.
		Operation • Same as impacts Common to All Systems, above.	Operation • Same as mitigation Common to All Systems, above.

Table 8-10. Summary of Potential Energy and Natural Resources Impacts and Proposed Mitigation Measures for Brightwater Systems (cont.)

Brightwater System	System Component	Impacts	Mitigation
No Action Alternative	Treatment Plant	Construction • No construction would take place, and no energy impacts would occur.	Construction • No mitigation would be required.
		Operation • Additional energy consumption could occur as a result of the existing King County treatment systems being expanded to handle the flow that would be sent to Brightwater.	Operation • Selection of energy efficient equipment for the expansions to the existing treatment system, to the extent possible.
	Conveyance	Construction • No construction would take place, and no energy impacts would occur.	Construction • No mitigation would be required.
		Operation • Additional energy consumption could occur as a result of the existing King County conveyance systems being expanded to handle the flow that would be sent to Brightwater.	Operation • Selection of energy efficient equipment for the expansions to the existing conveyance system, to the extent possible.
	Outfall	Construction • No construction would take place, and no energy impacts would occur.	Construction • No mitigation would be required.
		Operation • Additional energy consumption would be required to pump the additional flow through the effluent transfer system at the South Plant or the effluent pump station at West Point. No energy is required after the effluent pumps as the system flows by gravity.	Operation • Selection of energy efficient effluent pumps, to the extent possible.

8.6 References

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